It is striking evidence of the great velocity attained in tornadoes that straws and bits of hay are often driven like darts into pine boards, and even into the dense bark of hickory-trees. Professor Mees found, that, to obtain similar results by shooting straws from an air-gun, velocities of from one hundred and fifty to one hundred and seventy-five miles per hour were necessary.

Professor Mendenhall read a paper giving an account of the changes in the electrical condition of the atmosphere that are observed during thunder-storms, and referred to the excellent work done by the New England Meteorological Society in the study of these most interesting phenomena.

Prof. E. S. Nichols gave an account of a battery-cell on which he and Mr. W. S. Franklin had been experimenting, in which both electrodes were iron; but one was in a magnetic field, and the other not. The magnetized electrode was found to be sometimes electro-positive to the other, and sometimes electro-negative, depending on whether its magnetic poles were exposed to the liquid, or whether the neutral part alone was so exposed. A difference was also found between those liquids tending to produce ferric salts and those forming ferrous compounds.

Professor Barker presented two papers on behalf of Mr. Edison, in one of which a magnetic balance similar in principle to Wheatstone's bridge was described, by which the relative magnetic permeabilities of different samples of iron can be rapidly tested. In the other paper, Mr. Edison described an ingenious form of apparatus, which he calls a 'pyro-electric dynamo,' in which an electric current is obtained directly from heat-energy through the induction produced by alternately heating and cooling an iron core placed in a strong magnetic field and surrounded by an insulated coil.

Mr. C. E. Monroe presented to the section the results of some curious experiments in which blocks of gun-cotton, after having been stamped with certain letters, were exploded on flat plates of wrought iron. The gun-cotton blocks were placed with the lettered side down, and it was found, that, when the letters were stamped in relief, they appeared in relief on the iron after the explosion, and, on the other hand, when the letters were depressed in the gun-cotton, they were also depressed on the iron plate.

The session this year has been of considerable interest, and the number of communications presented to the section unusually large.

Section C.

[*Report not received in time for this issue.*]

Section D.

NINETEEN papers or subjects were presented during the sessions of this section by twelve gentlemen, as follows: on Nicaraguan woods, and friction of engines, by R. H. Thurston; on the American system of water-purification, by Albert R. Leeds; a new method of finding an equivalent uniform load, producing bending moments approximately equal to the maximum moments under a moving train, the deflection of girders and trusses, and re-action polygons and their properties (a new general class of graphical polygons suitable for the comparison of the bending moments and shearing stresses in simple girders and single intersection trusses, due to a moving train of wheel weights), by H. T. Eddy; on an improved method for testing metals, by Charles E. Monroe; on the effect upon the strength of iron by subjecting it to a pull while hot, Rankine's solution of the problem of turbines, and downward draught device for a furnace, by DeVolson Wood; on a new high-speed steam-engine indicator, by J. Burkitt Webb; on errors of approximate calculations of the effect of the inertia of the moving parts of a steam-engine, by D. S. Jacobus; on the theoretical effect of errors of observation in calorimeter experiments for determining the latent heat of steam, and improved arrangement of Siemens's platinum electrical pyrometer, by J. E. Denton; on the uniformity of planimeter measurements, by T. C. Mendenhall and John Mack; on mechanical inspection of railway-tracks and results obtained, by P. H. Dudley; on the theories of the lateral pressure of sand against retaining walls, by Mansfield Merriman; on national armament, by J. R. Haskell.

A number of these papers were accompanied by illustrative models or drawings, and some by both models and drawings. In some cases only a partial treatment of the subject was given, a complete consideration being reserved for another paper. In this way new lines of thought were suggested. and the authors thus indicated their intention of occupying the fields of thought which they thus partially opened up.

The section united with Section B (Physics) for an hour on Friday to hear two papers by J. Burkitt Webb, — one on a new dynamometer, which was illustrated by a working model; and the other on the experimental determination of the re-action of a liquid jet.

On Monday afternoon Sections D and I combined to listen to four papers relating to different aspects of a plan for a Nicaragua ship-canal. The first of these was on the general subject of isthmian transit, by H. C. Taylor; the second, on the engineering features of the Nicaragua Canal, by K. E. Peavy; the third, climatic and sanitary notes on the Nicaragua Canal route, by John F. Bransford; and the fourth, historical and geographical notes concerning the Nicaragua Canal route, by J. W. Miller. The work of the section may be mainly classified under four heads: —

1. Papers recording actual practical work in new fields; as, for example, the paper on the mechanical inspection of railway-tracks, which was accompanied by rolls of diagrams taken upon different lines of railway, showing the condition of their tracks, and from which the interesting and valuable results set forth in the paper were obtained.

2. Papers illustrating new or improved special machines or devices for accomplishing difficult ends. The new high-speed steam-engine indicator, by Professor Webb, illustrates this class. A model and drawings of the instrument were shown, by means of which the theory and operation of the indicator were readily understood.

3. Papers based upon laboratory experiments, like Professor Denton's, on calorimeter experiments for determining the latent heat of steam, in which the results of experiments with two forms of calorimeter were recorded, and made the basis of valuable deductions in regard to the theory and operation of the calorimeters compared.

4. Discussions, suggestions, and criticisms relating to the application of laws and principles, and to methods of research and computation, of which Professor Eddy's paper, on re-action polygons and their properties, is an example.

The papers were generally fresh and stimulating, and clearly aimed to advance scientific thought and attainments, to secure the practical achievement of valuable work upon a scientific basis, and to perfect theories and harmonize them with actual facts and to secure their easy and correct applications in new fields of scientific work. The sessions of the section must have proved of value to all who followed the work done, and many regret that most of the papers must appear in abstract rather than in full in the Proceedings of the association.

Section E.

GEOGRAPHY is by title included with geology in Section E of the association; but geology takes all the attention, and, in the present vigorous condition of geological investigation, geography as a science is almost forgotten. Under geology itself, the work of the International Congress of Geologists and of its American committee received the greatest share of time, as the vice-presidential address of Mr. Gilbert considered the first, and the several reports read by Dr. Frazer introduced the second. There has been apprehension among some that more might be attempted by the congress in the way of authoritative dictation and majority rulings on matters of opinion than would be justifiable in our rapidly advancing science — or, indeed, in any science. The dangers of such a course were well pointed out by Mr. Gilbert: "The proper function of the congress is the establishment of common means of expressing the facts of geology. It should not meddle with the facts themselves. It may regulate the art of the geologist, but it must not regulate his science. Its proper field of work lies in the determination of questions of technology; it is a trespasser if it undertakes the determination of questions of science. It may decree terms, but it must not decree opinions. . . . For science it is not merely illogical, it is